

Automated Voltage Stabilizer System

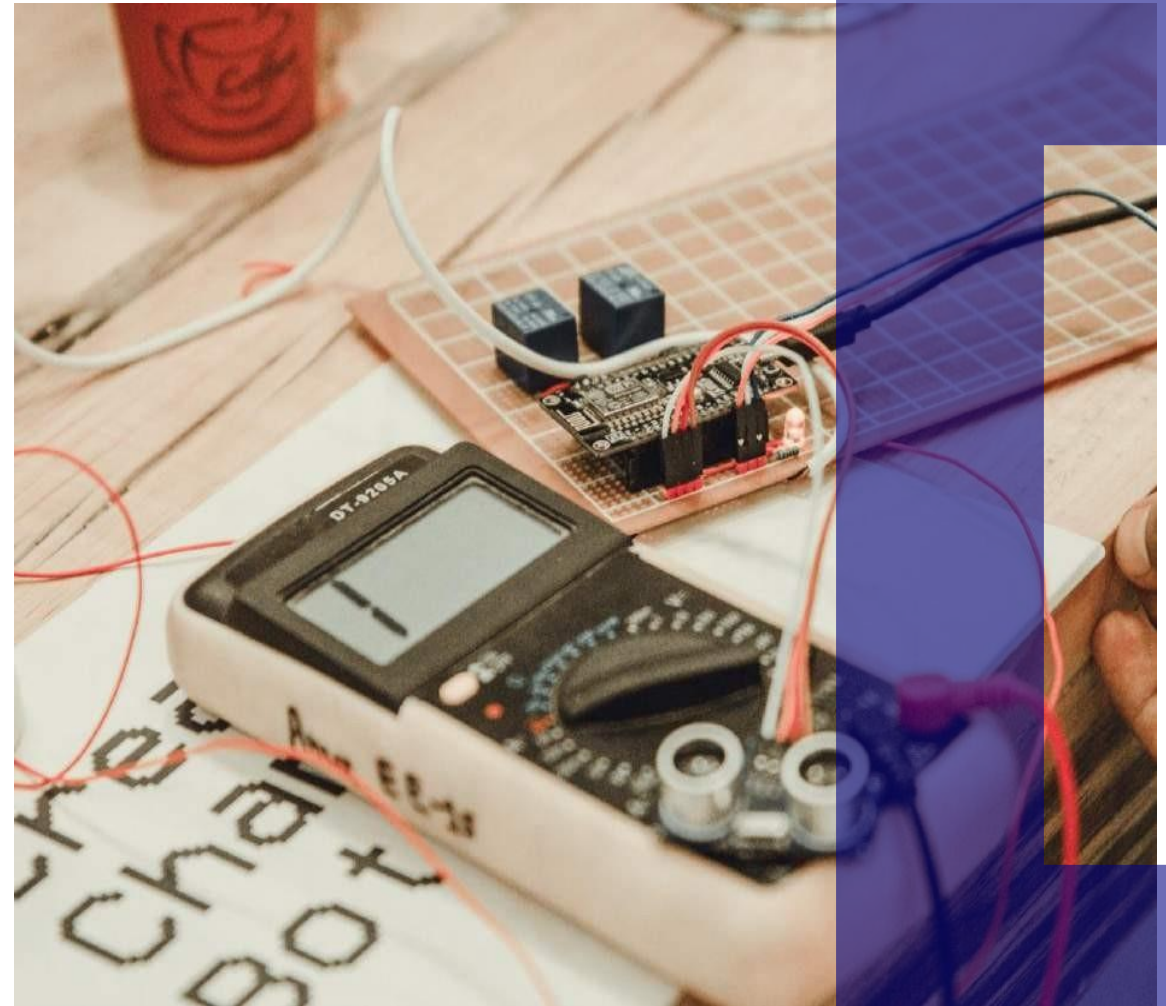


Team Members



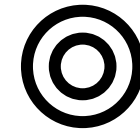
Introduction

A voltage stabilizer acts as a protective shield and reduces chances of malfunction. Installing a voltage stabilizer is essential to protect expensive electrical appliances such as Air Conditioners, television, refrigerator and computers. as we know that, Short circuits and overload are the most dangerous faults in the power system. They change the circuit structure causing changes in power distribution, which will bring energy loss, and damage to the stability of the power system, affecting the normal operation of electrical equipment. In order to improve the reliability of a power system, This project will focus on the overload and short circuit protection of the power system by voltage stabilizer.



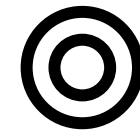


Components



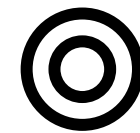
Transformer

In order to maintain a constant voltage or to maintain within the prescribed limits transformer is used. In tap-changing transformer, the tapplings on the coils of the transformer are placed so that by varying the turn-ratio voltage induced can be varied.



Bridge Rectifier

Bridge Rectifiers are circuits that convert alternating current (AC) into direct current (DC) using diodes arranged in the bridge circuit configuration



Combinational Relay Circuit

The combinational relay circuit is the combination of gates, whose perform the various type of digital operation.

Components



Arduino Nano

Arduino Nano is a microcontroller that use in this project for calculate high or low voltage and after calculating voltage it switching suitable relay for actual load voltage .



Potentiometer

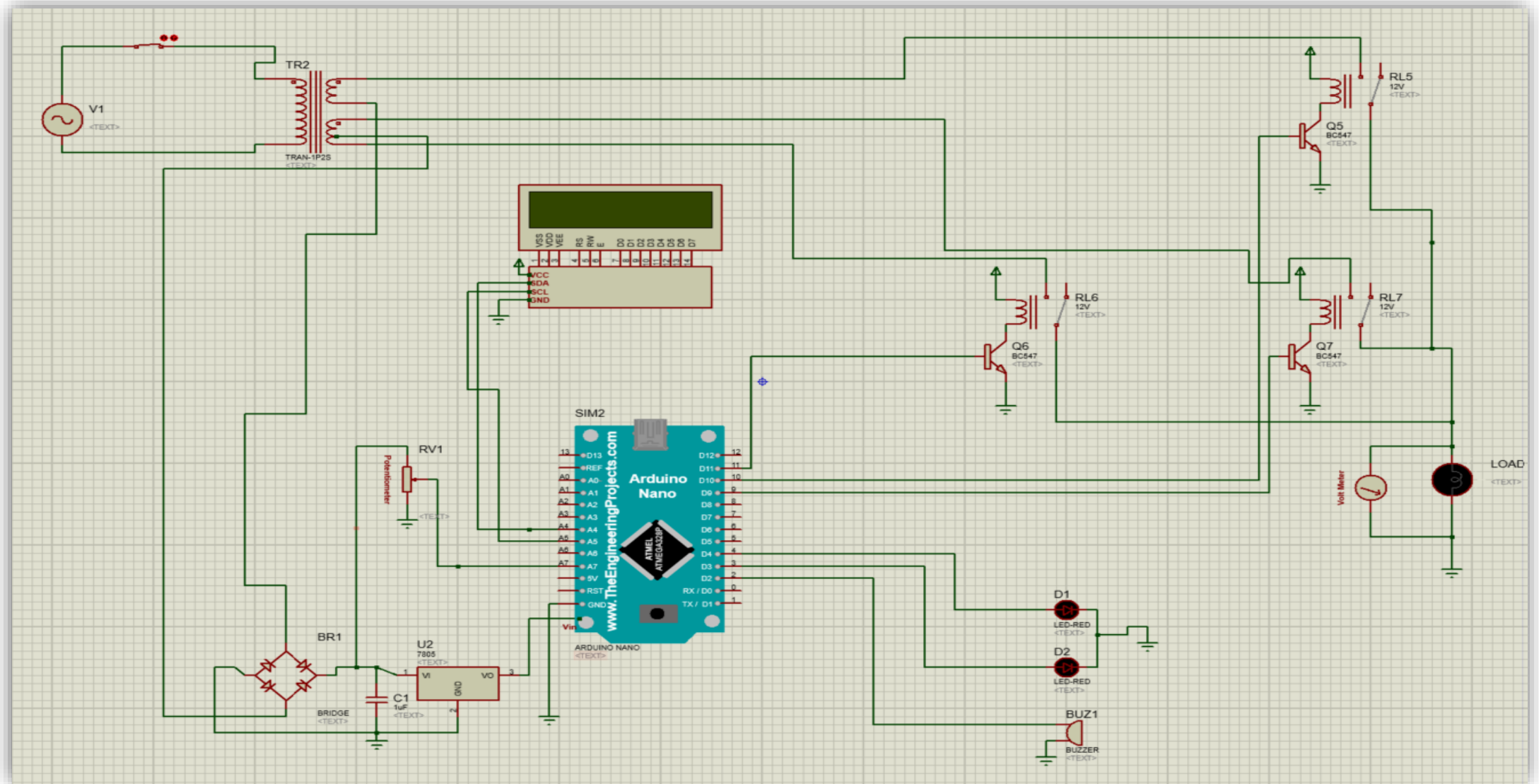
Giving unstable voltage to test this project .



LM7508

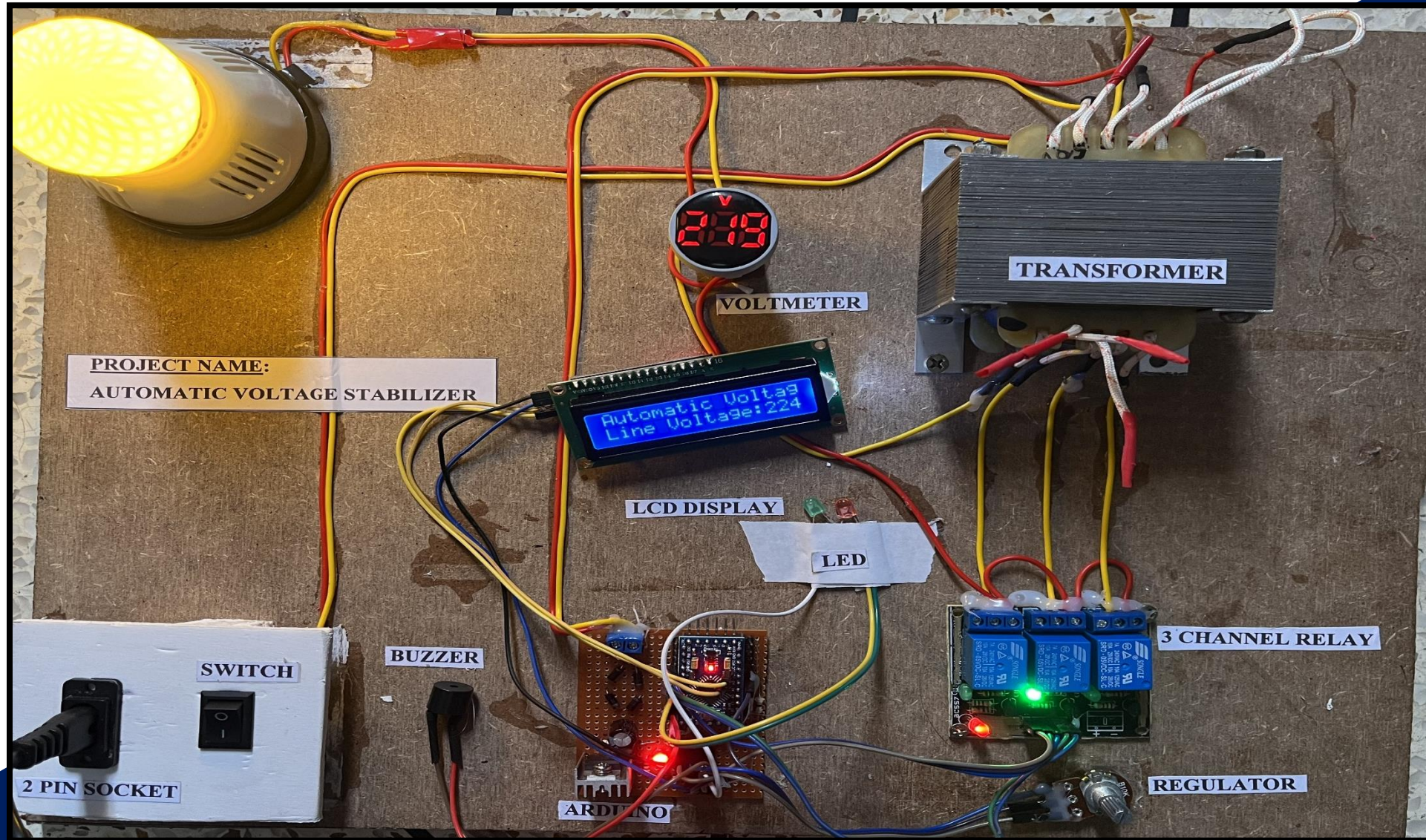
working as a +5V regulator and an adjustable voltage regulator





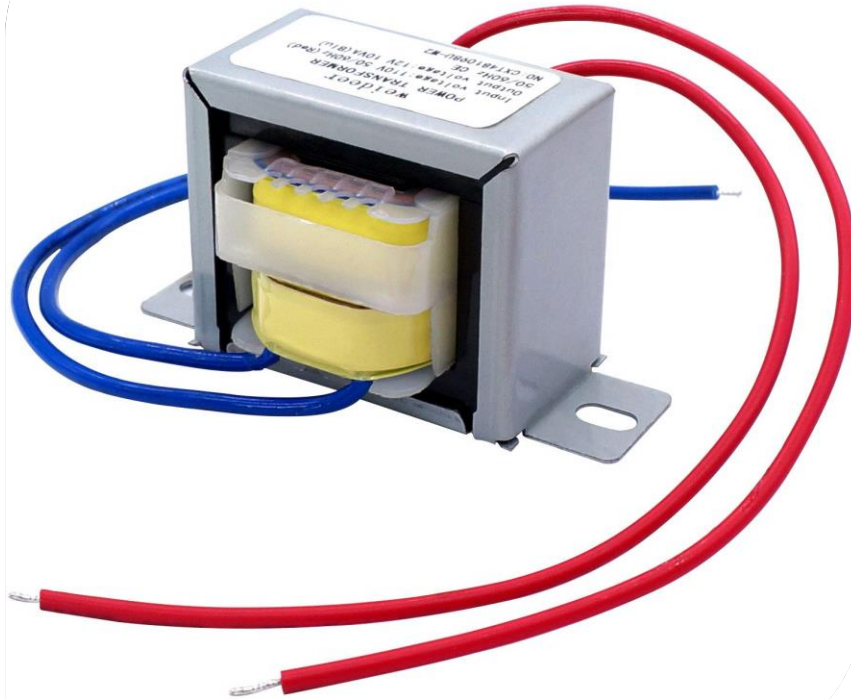
Protius simulation Diagram

Physical Setup



How does it works?

In this project at first, we have constructed a circuit for measure the supply voltage and secondly stabilized voltage. In the voltage stabilizer circuit, we have used tap changing transformer, relay, transistor. Basically, the bridge rectifier convert ac to dc voltage also reduces the voltage in 12v and then the reduced voltage goes through the voltage regulator to make it 5v. Then the Arduino pro mini receive the voltage reading and perform according with relay. The relay will altered voltage level and stabilize the total voltage.



Demo video

Arduino programme code

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27 ,16,2);
int L205 = 2;
int L215 = 3;
int L225 = 4;
int led_low = 5;
int led_high = 6;
int buzzer = 7;
int ver = A1;
void setup()
{
  Serial.begin(9600);
  pinMode(L205, OUTPUT);
  pinMode(L215, OUTPUT);
  pinMode(L225, OUTPUT);
  pinMode(ver , INPUT);
  pinMode(led_low , OUTPUT);
  pinMode(led_high , OUTPUT);
  pinMode(buzzer , OUTPUT);

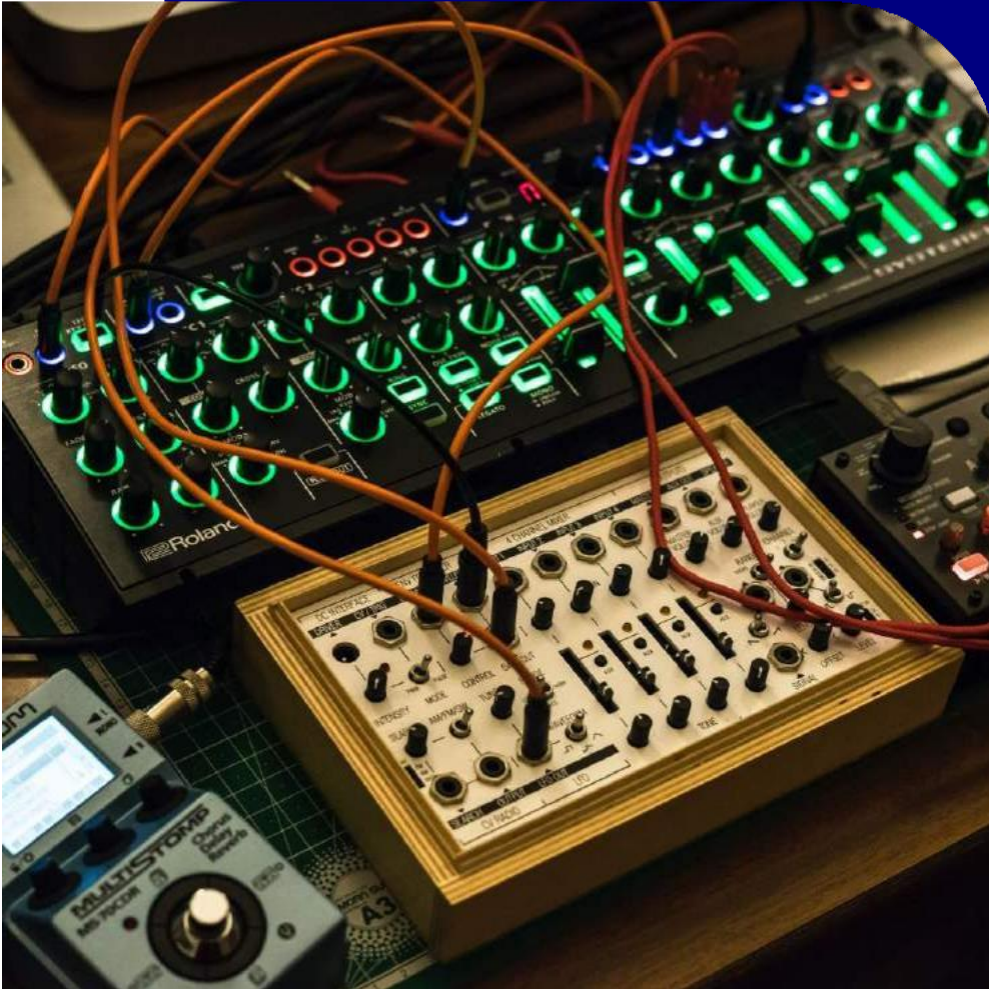
  lcd.init();
  lcd.backlight();
  lcd.begin(16,2);

  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Automatic Voltage");
  lcd.setCursor(0,1);
  lcd.print("...Stablizer...");
  delay(2000);
}

void loop()
{
  int variable = analogRead(A1);
  int varri = variable/ 3.10;
  Serial.println(varri);
  lcd.setCursor(0,1);
  lcd.print("Line Voltage:");
  lcd.print(varri);
  lcd.print(" ");

  if( varri > 195 && varri < 205){
    digitalWrite(L205 ,LOW);
    digitalWrite(L215 ,LOW);
```

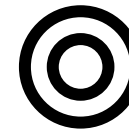
```
    digitalWrite(L225 ,HIGH);
    digitalWrite(led_high,LOW);
    digitalWrite(led_low,LOW);
    digitalWrite(buzzer,LOW);
  }
  if(varri > 205 && varri < 225){
    digitalWrite(L215 ,HIGH);
    digitalWrite(L205 ,LOW);
    digitalWrite(L225 ,LOW);
    digitalWrite(led_high,LOW);
    digitalWrite(led_low,LOW);
    digitalWrite(buzzer,LOW);
  }
  if(varri > 225 && varri < 235){
    digitalWrite(L225 ,LOW);
    digitalWrite(L215 ,LOW);
    digitalWrite(L205 ,HIGH);
    digitalWrite(led_low,LOW);
    digitalWrite(led_high,LOW);
    digitalWrite(buzzer,LOW);
  }
  if( varri > 250){
    digitalWrite(L215 ,LOW);
    digitalWrite(L205 ,LOW);
    digitalWrite(L225 ,LOW);
    digitalWrite(led_high,HIGH);
    digitalWrite(led_low,LOW);
    digitalWrite(buzzer,HIGH);
  }
  if( varri < 180){
    digitalWrite(L215 ,LOW);
    digitalWrite(L205 ,LOW);
    digitalWrite(L225 ,LOW);
    digitalWrite(led_low,HIGH);
    digitalWrite(led_high,LOW);
    digitalWrite(buzzer,HIGH);
    delay(500);
    digitalWrite(buzzer,LOW);
    delay(500);
    digitalWrite(L215 ,LOW);
    digitalWrite(L205 ,LOW);
    digitalWrite(L225 ,LOW);
  }
  delay(300);
```

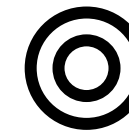
Applications



Voltage stabilizer will protect any sensitive equipment like an AC, refrigerator, or hospital emergency equipment. This equipment can easily be damaged because of voltage fluctuations.



If main line voltage decreases and low voltage occurs, then the voltage stabilizer increases voltage. And if the voltage rises, the stabilizer lowers it, preventing equipment damage.

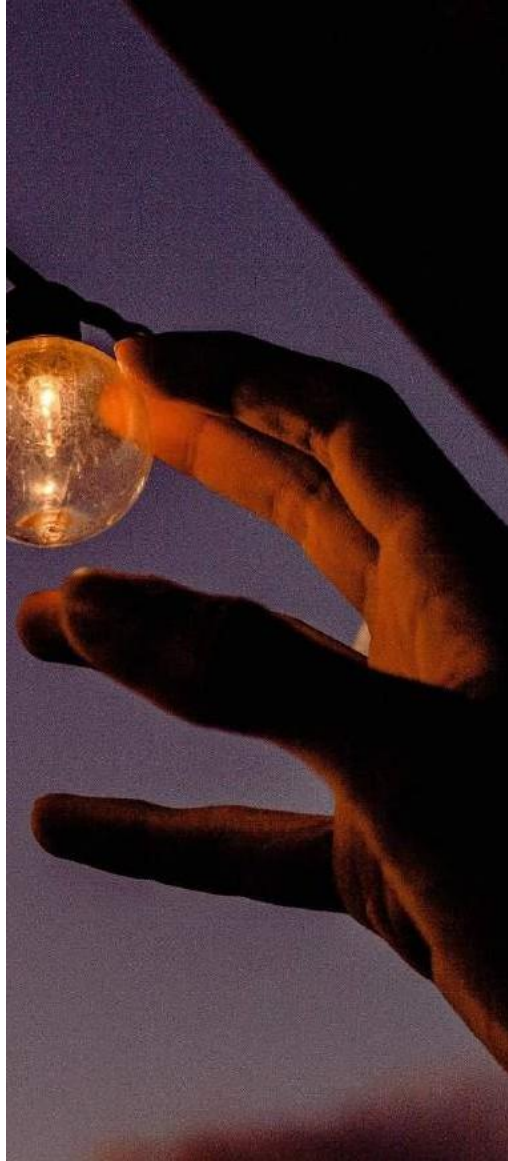


If any fluctuations occur in supply voltage, the voltage stabilizer constantly delivers voltage at output.

Disadvantages of unstable voltage supply



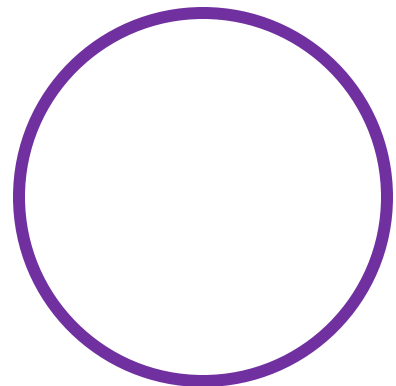
1. Increasing noise and see it as torque and speed issues plus an extreme temperature rise.
2. Voltage imbalance has a hugely negative impact on the life expectancy of motors and power electronics.
3. Severe insulation damage.
4. Melting or vaporizing conductors & Explosions.



Future Works

The project has a lot of room for improvement. We want to complete those in the near future. We will be adding the voltage stabilizer in servo system because this type of voltage stabilizer can control voltage more precisely than any other normal voltage stabilizer. We will add more relay and more conditions of voltage regulation more accuracy for specific device.

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Thank You!

